

The listing of the claims will replace the previous version,
and the listing of the claims:

LISTING OF THE CLAIMS

1-28. (cancelled)

B 29. (new) An electro-static chucking mechanism for chucking an object electro-statically, comprising:

a stage including a dielectric block having a chucking surface with a concave portion to be closed by the object for chucking thereon;

gas introducing channels communicating with the concave portion;

a chucking electrode provided in the dielectric block;

a main body fixed to the dielectric block and having a cavity;

a temperature controller attached to the main body to circulate a coolant to the cavity for controlling temperature of the object;

a chucking power supply connected to the chucking electrode to apply voltage thereto to chuck the object; and

a gas introduction system connected to the gas introducing channels for introducing heat-exchange gas into the concave to control temperature of the object while increasing pressure in the concave;

wherein the concave portion includes heat-exchange concaves for promoting heat-exchange under increased pressure, and gas-diffusion concaves deeper than the heat-exchange concave for diffusing the heat-exchange gas to the heat-exchange concaves, said gas-diffusion concaves including circumferential concaves arranged coaxially to the stage and having an outermost concave located ~~along a periphery of the object and a plurality of inner concaves~~ inside the outermost concave, and radial concaves extending from a center of the stage to the outermost concave while crossing the inner concaves.

30. (new) An electro-static chucking mechanism as claimed in claim 29, further comprising lift pins for receiving and transferring the object, each lift pin being disposed in each gas introducing

channel so that the heat-exchange gas is introduced to the concave only through the gas introducing channels in which the lift pins are provided.

31.(new) An electro-static chucking mechanism as claimed in claim 29, wherein the gas introducing channels communicate with the gas diffusion concaves at crossing portions of the radial concaves and the circumferential concave.

32.(new) An electro-static chucking mechanism as claimed in claim 31, wherein each lift pin is disposed in each gas introducing channel so that the heat-exchange gas is introduced to the concave only through the gas introducing channels in which the lift pins are provided.

33.(new) An electro-static chucking mechanism for chucking an object electro-statically, comprising:

a stage including a dielectric block having a chucking surface with a concave portion to be closed by the object for chucking thereon;

gas introducing channels communicating with the concave portion;

a chucking electrode provided in the dielectric block;

a main body fixed to the dielectric block and having a cavity;

a temperature controller attached to the main body to circulate a coolant to the cavity for controlling temperature of the object;

a chucking power supply connected to the chucking electrode to apply voltage thereto to chuck the object; and

~~a gas introduction system connected to the gas introducing channels for introducing heat-exchange gas into the concave portion to control temperature of the object while increasing pressure in the concave;~~

~~wherein the concave portion includes heat-exchange concaves for promoting heat-exchange under increased pressure, and gas=~~
~~diffusion concaves deeper than the heat-exchange concaves for diffusing the heat-exchange gas to the heat-exchange concaves; said~~

gas-diffusion concaves includes circumferential concaves arranged coaxially to the stage, and radial concaves extending from a center of the stage, said circumferential concaves having an outermost concave located along a periphery of the object, and a plurality of inner concaves inside the outermost concaves, said radial concaves crossing the inner concaves and reaching the outermost concave; and all of the gas introducing channels communicate with the gas-diffusion concaves at positions off the center of the stage.

34.(new) An electro-static chucking mechanism as claimed in claim 33, wherein the gas introducing channels communicate with the gas diffusion concaves at crossing portions of the radial concaves and the circumferential concave.

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35.(new) An electro-static chucking mechanism as claimed in claim 34, further comprising lift pins for receiving and transferring the object, each lift pin being disposed in each gas introducing channel so that the heat-exchange gas is introduced to the concave only through the gas introducing channels in which the lift pins are provided.

36.(new) An electro-static chucking mechanism as claimed in claim 29, wherein each of said heat-exchange concaves has a depth in a range of 1 to 20 μm .

37.(new) An electro-static chucking mechanism as claimed in claim 36, wherein said chucking surface has a contact area to contact with the object in a range of 3 to 20 % relative to a surface area of the object facing the stage.

38.(new) An electro-static chucking mechanism as claimed in claim 37, wherein said gas-diffusion concave has an area on the chucking surface in a range of 5 to 30 % relative to a surface area of the object facing the stage.

39.(new) An electro-static chucking mechanism as claimed in claim 38, wherein said gas-diffusion concave has a depth in the range of 50 to 1,000 μm .

40.(new) An electro-static chucking mechanism as claimed in claim 33, wherein each of said heat-exchange concaves has a depth in a range of 1 to 20 μm .

41.(new) An electro-static chucking mechanism as claimed in claim 40, wherein said chucking surface has a contact area to contact with the object in a range of 3 to 20 % relative to a surface area of the object facing the stage.

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42.(new) An electro-static chucking mechanism as claimed in claim 41, wherein said gas-diffusion concave has an area on the chucking surface in a range of 5 to 30 % relative to a surface area of the object facing the stage.

43.(new) An electro-static chucking mechanism as claimed in claim 42, wherein said gas-diffusion concave has a depth in the range of 50 to 1,000 μm .

44.(new) A surface processing apparatus, comprising:

a process chamber for receiving an object to be processed therein; and

an electro-static chucking mechanism according to claim 29, said electro-static chucking mechanism facing an inner surface of the process chamber for chucking said object electro-statically thereon in the process chamber

45.(new) A surface processing apparatus as claimed in claim 44, wherein said chucking mechanism further comprises lift pins for receiving and transferring the object, each lift pin being disposed in each gas introducing channel so that the heat-exchange gas is introduced to the concave only through the gas-introducing channels in which the lift pins are provided.

46.(new) A surface processing apparatus as claimed in claim 44, wherein the gas introducing channels communicate with the gas diffusion concaves at the crossing portions of the radial concaves and the circumferential concaves.

47.(new) A surface processing apparatus as claimed in claim 46, wherein each lift pin is disposed in each gas introducing channel so that the heat-exchange gas is introduced to the concave only through the gas introducing channels in which the lift pins are provided.

48.(new) A surface processing apparatus, comprising:

a process chamber for receiving an object to be processed therein; and

an electro-static chucking mechanism according to claim 33, said electro-static chucking mechanism facing an inner surface of the process chamber for chucking said object electro-statically thereon in the process chamber.

49.(new) A surface processing apparatus as claimed in claim 48, wherein the gas introducing channels communicate with the gas diffusion concaves at the crossing portions of the radial concaves and the circumferential concaves.

50.(new) A surface processing apparatus as claimed in claim 49, wherein said chucking mechanism further comprises lift pins for receiving and transferring the object, each lift pin being disposed in each gas introducing channel so that the heat-exchange gas is introduced to the concave only through the gas introducing channels in which the lift pins are provided.

51.(new) A surface processing apparatus as claimed in claim 44, wherein each of said heat-exchange concaves has a depth in a range of 1 to 20 μm .

52.(new) A surface processing apparatus as claimed in claim 51, wherein said chucking surface has a contact area to contact with

the object in a range of 3 to 20 % relative to a surface area of the object facing the stage.

53.(new) A surface processing apparatus as claimed in claim 52, wherein said gas-diffusion concave has a cross-sectional area along the chucking surface in a range of 5 to 30 % relative to a surface area of the object facing the stage.

54.(new) A surface processing apparatus as claimed in claim 53, wherein said gas-diffusion concave has a depth in a range of 50 to 1,000 μm .

55.(new) A surface processing apparatus as claimed in claim 48, wherein each of said heat-exchange concaves has a depth in a range of 1 to 20 μm .

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56.(new) A surface processing apparatus as claimed in claim 55, wherein said chucking surface has a contact area to contact with the object in a range of 3 to 20 % relative to a surface area of the object facing the stage.

57.(new) A surface processing apparatus as claimed in claim 56, wherein said gas-diffusion concave has a cross-sectional area along the chucking surface in a range of 5 to 30 % relative to a surface area of the object facing the stage.

58.(new) A surface processing apparatus as claimed in claim 57, wherein said gas-diffusion concave has a depth in a range of 50 to 1,000 μm .
